

**REMARKS/ARGUMENTS*****Status of Claims***

Claims 1, 2, 4, and 6-25 are pending in the application.

Claims 1, 4, 6, 8, 9, and 22 are hereby amended.

Claims 3 and 5 are hereby canceled.

Claims 24 and 25 are new.

Applicants hereby request further examination and reconsideration of the presently claimed application.

***Drawings***

The Examiner stated that corrected drawings are required because Figures 1-6 were informal drawings. As such, replacement drawings are submitted herewith.

***Double Patenting***

Claims 1, 2, 6-8, 13-17, 22, and 23 stand rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-3 of U.S. Patent 6,720,468. Applicants respectfully traverse this ground for rejection. However, in the interest of furthering prosecution of this application, Applicants herein submit a terminal disclaimer directed to U.S. Patent 6,720,468 to overcome this rejection. Accordingly, Applicants respectfully request that the rejection of the pending claims over claims 1-3 of U.S. Patent 6,720,468 on the grounds of nonstatutory obviousness-type double patenting be withdrawn.

***Claim Rejections – 35 USC § 102***

Claims 1 and 2 stand rejected under 35 USC § 102(b) as being anticipated by *Brown* (U.S. Patent 5,300,126). Claim 2 depends on claim 1, thus claims 1 and 2 stand or fall on the application of *Brown* to independent claim 1. The Applicants respectfully submit that *Brown* does not

anticipate claims 1 and 2. According to MPEP § 2131, “[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” The Applicants respectfully submit that *Brown* fails to teach each and every limitation in currently pending claim 1, and therefore does not anticipate claims 1 and 2.

Claim 1 reads:

1. A method for removing conjugated olefins from a composition comprising:  
contacting the composition with a Diels-Alder dienophile to convert conjugated olefins to a Diels-Alder adduct; and  
arresting the Diels-Alder adduct via a selectively permeable barrier or a phase differential.

*Brown* teaches that the conjugated dienes are removed from the olefinic feedstock by reacting the conjugated dienes with one or more dienophiles to form adducts. However, *Brown* teaches that the resulting adducts and monoolefins may be subject to downstream distillation after etherification.

**Brown fails to teach that a selectively permeable barrier or a phase differential may be used to arrest the adduct.** In fact, the Examiner expressly conceded this point with the statement, “*Brown* does not specifically disclose the step of separating [the] Diels-Alder adduct from the product mixture employing the methods as claimed such as membrane or filter.” *Office Action* dated April 2, 2007, p. 4. Because *Brown* fails to teach that the adduct is arrested via a selectively permeable barrier, *Brown* fails to teach each and every limitation of currently pending claim 1 and claims 1 and 2 should be allowed over the cited art.

#### ***Applicants’ Admitted Prior Art***

Regarding the alleged Applicants’ Admitted Prior Art (*AAPA*), the Applicants have not admitted that it was known to arrest Diels-Alder adducts from a monoolefin composition and/or that any particular separation means was known to be capable of separating the adduct from the monoolefin-containing fluid prior to priority date of the present application. The Examiner does

not dispute the fact that *Brown* fails to teach the arresting of the adduct from the monoolefins. Instead, the Examiner relies on paragraph 41 of the Applicants' disclosure for the teaching of the separation of the adduct from the monoolefins and/or a particular separation means for the separation of the adduct from the monoolefins. MPEP § 2129 explains the situations where the Doctrine of Applicants' Admitted Prior Art is applicable. First, when the Applicants make a statement during prosecution identifying the work of another as "prior art," such statements may be treated as prior art. Second, when the specification identifies the work of another as "prior art," such statements may be treated as prior art. In either case, "[it] is necessary to consider everything [the Applicants] have said about what is prior art to determine the exact scope of their admission." *In re Nomiya*, 184 USPQ 607, 612 (CCPA 1975).

Paragraph 41 states:

The adduct, preferably Diels-Alder adduct, can be separated from the monoolefin-containing fluid by any separating means known in the art capable of separating an adduct from a monoolefin-containing fluid. Examples of suitable separating means include, but are not limited to, distillation, adsorption, membrane separation, and the like, and combinations thereof. The Diels-Alder adduct typically has a substantially higher molecular weight than the monoolefin-containing fluid being purified. Thus, conventional distillation is generally capable of separating the Diels-Alder adduct. Another way to accomplish the separation is by performing the conjugated diene/Diels-Alder dienophile reaction and Diels-Alder adduct separation or removal in a reactive distillation apparatus. For example, the boiling point of 1-butene is -6.3°C and the boiling point of tetrahydrophthalic anhydride is greater than 100°C. For reference, the boiling point of butadiene is -4.5°C.

As can be seen above, paragraph 41 merely states that "the adduct can be separated from the monoolefin-containing fluid by any separating means known in the art capable of separating an adduct from a monoolefin-containing fluid." However, this is not an admission that the separation of the adducts from monoolefin-containing fluids was known and/or that a particular separating means capable of separating the adduct from the monoolefin-containing fluid was known prior to priority date of the present application. Rather, this

passage states that various separation means are known in the art, and that any of these separation means may be used to separate the adduct from the monoolefin-containing fluid **provided that** such separation means **are capable** of doing so. The Examiner's suggested interpretation of paragraph 41 represents impermissible hindsight by using the Applicants' detailed description to provide a teaching or suggestion that is absent in *Brown*. Because paragraph 41 merely states that various separation means are known **and not** that the separation of the adducts from monoolefin-containing fluids was known and/or that a particular separating means capable of separating the adduct from the monoolefin-containing fluid was known prior to priority date of the present application, paragraph 41 is not prior art for the purposes of teaching or suggesting the separation of the adduct from the monoolefin-containing fluids and/or the use of a particular separating means for separating the adduct from the monoolefin-containing fluid. As such, *the Examiner's alleged AAPA* cannot be used to establish a *prima facie* case of obviousness as to the pending claims.

#### ***Claim Rejections – 35 USC § 103***

Claims 3-23 stand rejected under 35 USC § 103(a) as being unpatentable over *Brown* in view of the Examiner's allegation of *AAPA*. Claims 3 and 5 have been canceled, claims 4 and 6-17 depend on claim 1, and claims 19-21 depend on claim 18. Thus, claims 4 and 6-23 stand or fall on the application of *Brown* and the *Examiner's alleged AAPA* to independent claims 1, 18, 22, and 23.

The Applicants respectfully submit that *Brown* and the *Examiner's alleged AAPA* do not establish a *prima facie* case of obviousness as to the pending claims. According to MPEP § 2142, three basic criteria must be met to establish a *prima facie* case of obviousness:

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or

references when combined) must teach or suggest all the claim limitations.  
The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure.

Similarly, the fact that the Examiner has the burden of proof with respect to the elements of the *prima facie* case of obviousness is also well defined in MPEP § 2142:

The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.

The Applicants respectfully submit that *Brown* fails to teach or suggest the features in independent claims 1, 18, 22, and 23. Furthermore, Applicants respectfully submit that the *Examiner's alleged AAPA* is not prior art for the reasons given above. Consequently, *Brown* and the *Examiner's alleged AAPA* are insufficient to create a *prima facie* case of obviousness as to claims 4 and 6-23.

In regard to claim 4, claim 4 depends from independent claim 1 and claim 1 reads:

1. A method for removing conjugated olefins from a composition comprising:  
contacting the composition with a Diels-Alder dienophile to convert conjugated olefins to a Diels-Alder adduct; and  
arresting the Diels-Alder adduct via a selectively permeable barrier or a phase differential.

The Examiner admits that *Brown* does not teach or suggest "separating the Diels-Alder adduct from the product mixture employing the methods as claimed." Office Action, Page 4. Furthermore, the *Examiner's alleged AAPA* is not prior art for the reasons given above. Therefore, *Brown* and the *Examiner's alleged AAPA* cannot be used to make out a *prima facie* case of obviousness with regards to independent claim 1. Consequently, claims 4 and 6-17 should be allowed over the cited art.

In regard to claim 18, claim 18 reads:

18. A method comprising:

confining a Diels-Alder dienophile to a first side of a selectively permeable barrier wherein the barrier is more permeable to conjugated olefins and less permeable to Diels-Alder dienophile and Diels-Alder adduct; and

contacting a composition comprising mono-olefins and conjugated olefins with the Diels-Alder dienophile to form Diels-Alder adduct;

wherein the contacting reduces the concentration of conjugated olefins in the composition.

*Brown* fails to teach or suggest the use of a **selectively permeable barrier** to separate the adduct from the monoolefins. Specifically, the Examiner admits that *Brown* does not teach or suggest the selectively permeable barrier. Additionally, even if *Brown* taught the use of a selectively permeable barrier (and without conceding such), *Brown* still fails to teach or suggest “confining a Diels-Alder dienophile to a first side of a selectively permeable barrier.” Furthermore, the Examiner’s alleged AAPA is not prior art for the reasons given above. Consequently, *Brown* and the Examiner’s alleged AAPA cannot be used to make out a *prima facie* case of obviousness with regards to claim 18, and claims 18-21 should be allowed over the cited art.

In regards to currently pending claim 22, claim 22 reads:

22. A method for removing conjugated olefins from a composition comprising:

bubbling the composition through a liquid comprising Diels-Alder dienophile to form a liquid comprising Diels-Alder adduct; and

arresting the Diels-Alder adduct,

wherein the bubbling and the arresting occur in a substantially common zone.

First, *Brown* fails to teach or suggest “bubbling the composition through a liquid comprising Diels-Alder dienophile.” *Brown* fails to disclose the phases of the conjugated olefins and the dienophile, and consequently does not disclose a liquid phase dienophile and a vapor phase conjugated olefin composition. Second, *Brown* fails to teach or suggest that “the bubbling and the arresting occur in a substantially common zone.” Specifically, *Brown* teaches that his conjugated olefins are

contacted with the dienophile, after which the resulting mixture is subjected to an etherification process. The etherified mixture may then be subject to distillation. *Brown's* three-step contacting-etherification-distillation process occurs in at least three different vessels, and thus does not occur in a common zone as recited in claim 22. Furthermore, the *Examiner's alleged AAPA* is not prior art for the reasons given above. Consequently, *Brown* and the *Examiner's alleged AAPA* cannot be used to make out a *prima facie* case of obviousness with regards to claim 22, and claim 22 should be allowed over the cited art.

In regard to independent claim 23, claim 23 reads:

23. A method for removing conjugated olefins from a non-solid composition comprising contacting the composition with a solid comprising Diels-Alder dienophile to form a solid comprising Diels-Alder adduct.

As mentioned above, *Brown* fails to disclose the phases of the feedstock, dienophile, or adduct. However, *Brown* teaches that the adduct does not separate from the monoolefins during the etherification process (*See Brown*, col. 9, lines 3-13). Therefore, the adduct is either a liquid or dissolved in the liquid phase and *Brown* does not teach a method that forms "a solid comprising Diels-Alder adduct." Furthermore, the *Examiner's alleged AAPA* is not prior art for the reasons given above. Consequently, *Brown* and the *Examiner's alleged AAPA* cannot be used to make out a *prima facie* case of obviousness with regards to claim 23, and claim 23 should be allowed over the cited art.

In addition, *Brown* cannot be combined with *Examiner's alleged AAPA* because *Brown* teaches away from the separation of the adduct from the monoolefins. MPEP § 2141.02.VI states: "A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984)." *Brown*

specifically states that a significant feature of his invention is the fact that the adduct is not immediately separated from the monoolefins:

One of the significant features of the process of the invention is the fact that the treated feedstock containing the diene/dienophile adduct can be subjected to etherification of isoolefins in the feedstock without separation of the adduct. The adduct is carried through the etherification step into the reaction effluent. Separation of the effluent by means well known in the art such as distillation produces a gasoline boiling range product stream that contains both alkyl tertiary alkyl ethers and adduct which, in the case of MA, is tetrahydrophthalic anhydride or alkyl substituted derivatives thereof. The final gasoline boiling range product can also contain reaction products of the anhydride adduct or MA with alkanol that occurs during the etherification step or the product may contain unconverted MA. *Brown*, col. 9, lines 3-13.

As shown by the above statement, *Brown* teaches that it is generally considered advantageous to retain the adducts with the monoolefins after the conjugated olefins are removed from the feedstock. In fact, as explained below, the adduct may remain with the monoolefins to the final product as doing so results in gasoline that is enriched with oxygen and has a higher octane value. Thus, *Brown*'s teaching of the retention of the adduct with the monoolefins teaches away from their separation. Because *Brown* teaches away from the separation of the adduct from the monoolefins, *Brown* and *Examiner's alleged AAPA* cannot be combined and the Examiner cannot make out a *prima facie* case of obviousness as to the pending claims.

Even if *Brown* or *Examiner's alleged AAPA* taught or suggested the separation of the adduct from the monoolefin-containing fluids, it is contrary to the accepted wisdom in the art to do so. As stated in MPEP § 2145.X.D.3: "The totality of the prior art must be considered, and proceeding contrary to accepted wisdom in the art is evidence of nonobviousness. *In re Hedges*, 783 F.2d 1038, 228 USPQ 685 (Fed. Cir. 1986)." In relation to the cited art, the accepted wisdom in the art was to retain Diels-Alder adducts with the monoolefins. Evidence of this accepted wisdom is found in *Brown* at col. 3, lines 29-37:

Where the olefin conversion process comprises etherification of isoolefins with alkanol in a C<sub>4</sub>+ or C<sub>5</sub>+ olefinic hydrocarbon feedstream to produce a gasoline boiling range product enriched in oxygen and rich in high octane value alkyl tertiary alkyl ethers, it has been discovered that the adduct, particularly those adducts formed with MA, is in the gasoline range and contributes usefully to the oxygen enrichment of the gasoline and to octane value.

and at col. 9, lines 23-35.

It is a matter of considerable surprise and novelty in the present invention that the tetrahydrophthalic anhydride adducts prepared as described above in a gasoline boiling range hydrocarbon mixture result in a unique composition that displays both high octane value as well as supplementing the oxygen content of the gasoline. Considering the relatively high molecular weight of these adducts, the fact that they fall within the useful range of gasoline components, albeit at the high end, is unexpected; however, even more unexpected is the fact that they produce blending research octane numbers (RON) and motor octane numbers (MON) in the eighties.

As shown by the above statements, *Brown* teaches that it is generally considered advantageous to retain the adducts with the monoolefins. By doing so, the resulting gasoline is enriched with oxygen and has a higher octane value. Separating the adduct(s) from the monoolefins and/or the use of particular separating means for separating the adduct(s) from the monoolefins was proposed by the Applicants, not the cited art. Thus, the Examiner's conclusion of obviousness is not based on the teaching of the art, but rather is based on improper hindsight reasoning. As such, *Brown* cannot be modified to obtain the claimed invention, and the pending claims should be allowed.

### **New Claims**

New claims 24 and 25 have been added. Claims 24 and 25 depend on claim 1 and are neither anticipated nor rendered obvious by the cited art of record for the reasons given above. In addition, the cited art of record fails to anticipate or render obvious a method "wherein the Diels-Alder dienophile and the Diels-Alder adduct do not mix homogenously with a bulk of the composition before, during, or after the contacting" as recited in claim 24. Similarly, the cited art of record fails to teach or render obvious a method "wherein the Diels-Alder adduct is arrested

about simultaneously, about concurrently, about instantaneously, or about immediately following the formation of the Diels-Alder adduct" as recited in claim 25. Support for these new claims is found in paragraphs 44-50 of the specification.

## CONCLUSION

Consideration of the foregoing amendments and remarks, reconsideration of the application, and withdrawal of the rejections and objections is respectfully requested by Applicants. No new matter is introduced by way of the amendment. It is believed that each ground of rejection raised in the Office Action dated April 2, 2007 has been fully addressed. If any fee is due as a result of the filing of this paper, please appropriately charge such fee to Deposit Account Number 50-1515, Conley Rose, P.C. If a petition for extension of time is necessary in order for this paper to be deemed timely filed, please consider this a petition therefore.

If a telephone conference would facilitate the resolution of any issue or expedite the prosecution of the application, the Examiner is invited to telephone the undersigned at the telephone number given below.

Respectfully submitted,

Date: 7/2/07

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